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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,225	04/07/2006	Tadashi Ogasawara	12054-0056	5765
22902	7590	04/29/2008		
CLARK & BRODY 1090 VERMONT AVENUE, NW SUITE 250 WASHINGTON, DC 20005			EXAMINER MCGUTHRY BANKS, TMA MICHELE	
			ART UNIT	PAPER NUMBER
			1793	
			MAIL DATE	DELIVERY MODE
			04/29/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/575,225	Applicant(s) OGASAWARA ET AL.	
	Examiner TIMA M. MCGUTHRY-BANKS	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>4/7/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Status of Claims

Claims 1-3, 5-18, and 21-23 are as originally filed, and Claims 4, 19 and 20 are currently amended.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

The disclosure is objected to because of the following informalities: on page 5, “DECLOSURE” should be “DISCLOSURE.”

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Bienvenu et al (US 4,320,339).

Bienvenu et al anticipates the claimed invention. Bienvenu et al teaches the preparing of metals by reduction of their salts. The metal halide to be reduced was TiCl_4 and the reducing metal was calcium in Example 1. A quantity of CaCl_2 was poured into a reactor and a fused salt bath was formed at a temperature of 830 °C. Calcium was passed to the top of the reactor and dissolved in the bath. TiCl_4 was fed and reduced by Ca. The lower half of the bath was withdrawn after reaction completion, and titanium powder was formed (column 4, line 62 to column 5, line 28). Regarding Claim 2, the salt can be a mixture of CaCl_2 and NaCl (column 3, line 33). Regarding Claim 3, a mixture of several halides of different metals can be used (column 3, lines 40-42). Regarding Claim 4, Bienvenu et al teaches introducing the metal halide and the reducing metal such that the distance between the two injection points is such that the halide and reducing metal respectively are dissolved in the salt before they are above to react to each other (column 3, lines 1-7). This limitation reads on the Ca being supplied from a lower portion, since Bienvenu et al does not limit the injection of the metal halide to only below. Regarding Claim 5, the Ca can be in a mixture of Mg/Ca (line 24).

Claims 17 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Bienvenu et al.

Bienvenu et al anticipates the claimed invention. Bienvenu et al teaches the preparing of metals by reduction of their salts. The metal halide to be reduced was TiCl_4 and the reducing metal was calcium in Example 1. A quantity of CaCl_2 was poured into a reactor and a fused salt bath was formed at a temperature of 830 °C. Calcium was passed to the top of the reactor and dissolved in the bath. TiCl_4 was fed and reduced by Ca. The lower half of the bath was withdrawn after reaction completion, and titanium powder was formed (column 4, line 62 to

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column 5, line 28). Regarding the Ca concentration, since Bienvenu et al teaches using Ca, it is inherent that the concentration would be greater than 0 mass %. Regarding the temperature, Bienvenu et al teaches temperatures greater than 500 °C (column 2, line 62) and gives examples of 830 °C (column 5, line 2) and 580 °C (line 64). Regarding Claim 20, the salt can be a mixture of CaCl₂ and NaCl (column 3, line 33).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

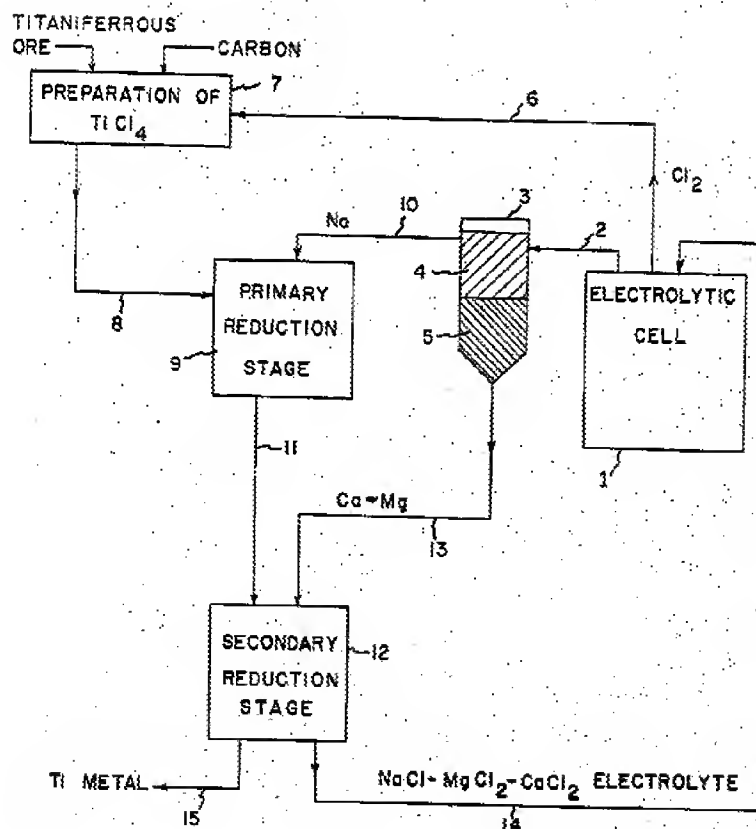
This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienvenu et al as applied to Claim 1 above, further in view of Winter (US 2,890,112).

Bienvenu et al discloses the invention substantially as claimed. However, Bienvenu et al does not disclose discharging CaCl_2 outside the reactor vessel as in Claim 6 or electrolyzing CaCl_2 and generating Ca by the electrolysis for the generation reaction of Ti or the Ti alloy in the reactor vessel as in Claim 7. Winter teaches producing titanium metal as shown below in the Figure:



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It would have been obvious to one of ordinary skill in the art at the time the invention was made to recover Ca from the CaCl_2 produced in the process of Bienvenu et al as taught by Winter, since Winter teaches utilizing by-products to produce a magnesium-calcium alloy for use in the reduction for use in the reduction of a metal halide reactant, specifically titanium metal and alloys thereof (column 1, lines 60-67). Winter also teaches that it is well known in the art to chemically and/or electrically recover the by-product halide salt obtained from the reduction to recover reducing metal and halogen values present therein (column 1, lines 23-26). Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter.

Claims 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienvenu et al in view of Winter.

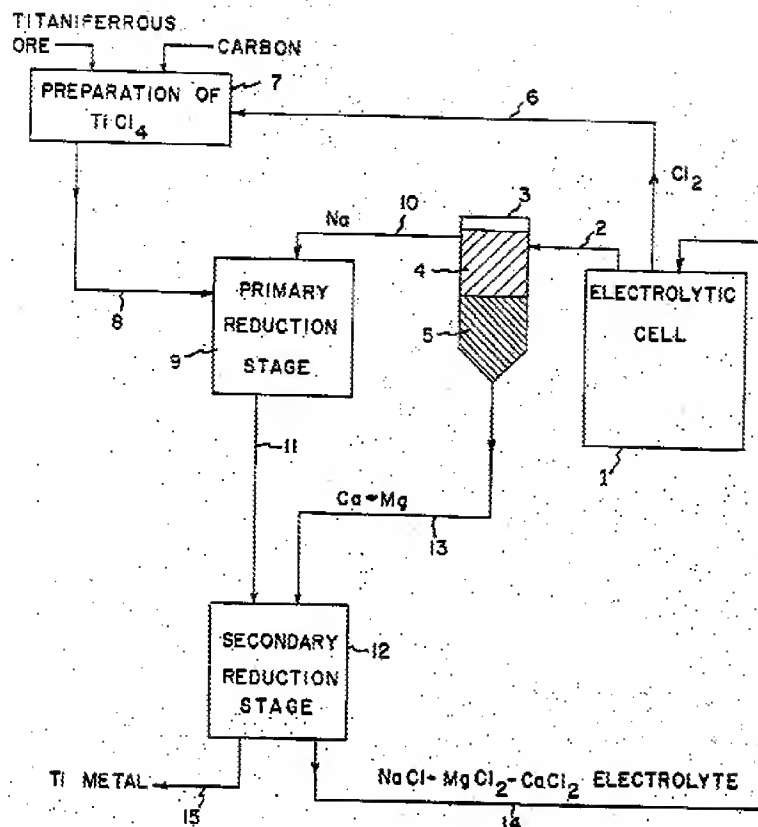
Bienvenu et al anticipates the claimed invention. Bienvenu et al teaches the preparing of metals by reduction of their salts. The metal halide to be reduced was TiCl_4 and the reducing metal was calcium in Example 1. A quantity of CaCl_2 was poured into a reactor and a fused salt bath was formed at a temperature of 830 °C. Calcium was passed to the top of the reactor and dissolved in the bath. TiCl_4 was fed and reduced by Ca. The lower half of the bath was withdrawn after reaction completion, and titanium powder was formed (column 4, line 62 to column 5, line 28). Regarding the Ca concentration, since Bienvenu et al teaches using Ca, it is inherent that the concentration would be greater than 0 mass %. Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter.

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Regarding Claim 12, the salt can be a mixture of CaCl_2 and NaCl (column 3, line 33). Regarding Claim 13, Bienvenu et al teaches temperatures greater than 500°C (column 2, line 62) and gives an example of 580°C (column 5, line 64). Regarding Claim 15, the salt can be a mixture of CaCl_2 and NaCl (column 3, line 33). Regarding Claim 16, Bienvenu et al teaches introducing the metal halide and the reducing metal such that the distance between the two injection points is such that the halide and reducing metal respectively are dissolved in the salt before they are above to react to each other (column 3, lines 1-7). This limitation reads on the Ca being supplied from a lower portion, since Bienvenu et al does not limit the injection of the metal halide to only below. However, Bienvenu et al does not disclose discharging the molten salt outside the reactor vessel or electrolyzing to generate Ca by the electrolysis for the generation reaction of Ti or the Ti alloy in the reactor vessel as in Claims 8-11 and 14.

Winter teaches producing titanium metal as shown below in the Figure:

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Regarding Claim 9, Ca is produced by the electrolytic cell and used for reduction. Regarding Claim 10, the molten salt is electrolyzed. Regarding Claim 11, Cl_2 reacts with titaniferrous ore to form TiO_2 and is a by-product of the electrolysis step and $TiCl_4$ thus produced is used to generate Ti or Ti alloy. Regarding Claim 14, Na is separated and generated. Electrolysis takes place at 520-900 °C (column 2, lines 24 and 25); the temperature at the secondary reduction stages is 600-850 °C (column 5, lines 13-18); it would be expected that the temperature would be within the claimed range. It would have been obvious to one of ordinary skill in the art at the time the invention was made to recover Ca from the $CaCl_2$ produced in the process of Bienvenu et al as taught by Winter, since Winter teaches utilizing by-products to produce a magnesium-calcium alloy for use in the reduction for use in the reduction of a metal halide reactant,

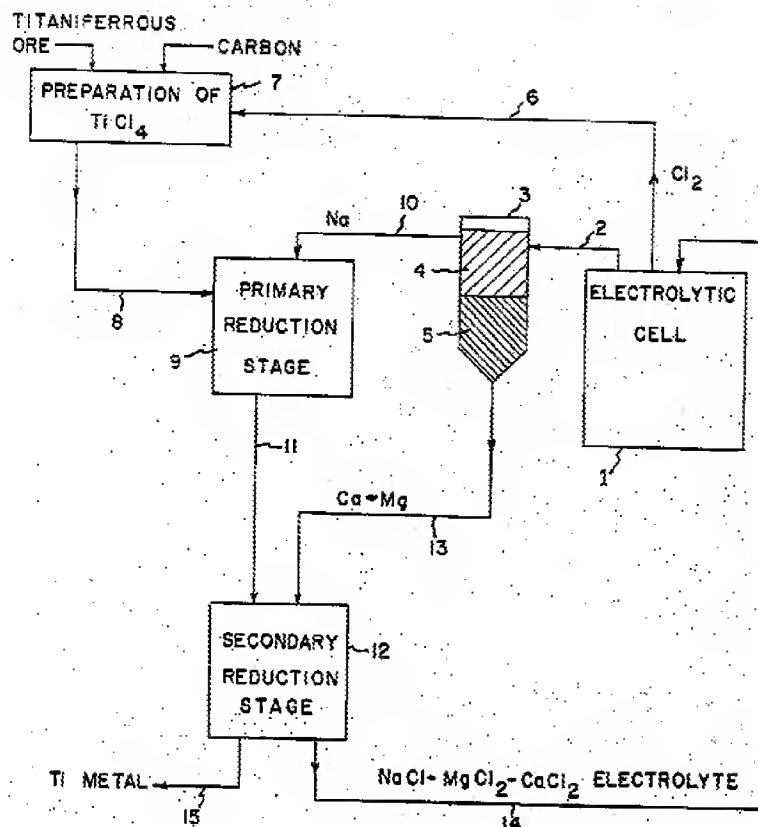
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specifically titanium metal and alloys thereof (column 1, lines 60-67). Winter also teaches that it is well known in the art to chemically and/or electrically recover the by-product halide salt obtained from the reduction to recover reducing metal and halogen values present therein (column 1, lines 23-26). Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter.

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienvenu et al as applied to claim 17 above, and further in view of Winter.

Bienvenu et al discloses the invention substantially as claimed. However, Bienvenu et al does not disclose discharging CaCl_2 outside the reactor vessel as in Claim 21 or electrolyzing CaCl_2 and generating Ca by the electrolysis for the generation reaction of Ti or the Ti alloy in the reactor vessel as in Claim 22. Winter teaches producing titanium metal as shown below in the Figure:

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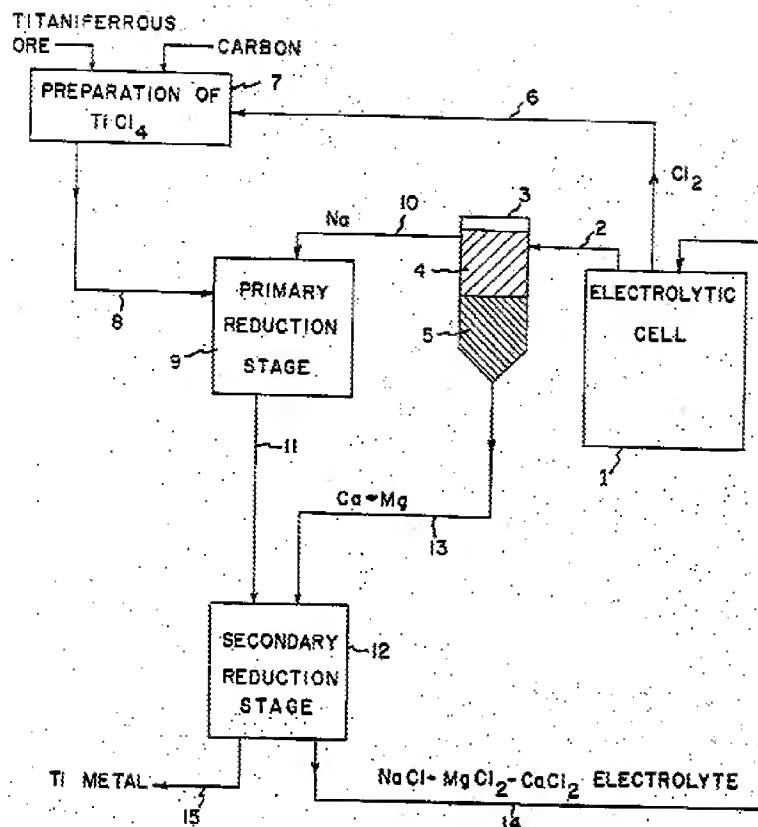
It would have been obvious to one of ordinary skill in the art at the time the invention was made to recover Ca from the $CaCl_2$ produced in the process of Bienvenu et al as taught by Winter, since Winter teaches utilizing by-products to produce a magnesium-calcium alloy for use in the reduction for use in the reduction of a metal halide reactant, specifically titanium metal and alloys thereof (column 1, lines 60-67). Winter also teaches that it is well known in the art to chemically and/or electrically recover the by-product halide salt obtained from the reduction to recover reducing metal and halogen values present therein (column 1, lines 23-26). Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter.

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Claims 18, 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienvenu et al in view of Winter.

Bienvenu et al anticipates the claimed invention. Bienvenu et al teaches the preparing of metals by reduction of their salts. The metal halide to be reduced was TiCl_4 and the reducing metal was calcium in Example 1. A quantity of CaCl_2 was poured into a reactor and a fused salt bath was formed at a temperature of 830 °C. Calcium was passed to the top of the reactor and dissolved in the bath. TiCl_4 was fed and reduced by Ca. The lower half of the bath was withdrawn after reaction completion, and titanium powder was formed (column 4, line 62 to column 5, line 28). Regarding the Ca concentration, since Bienvenu et al teaches using Ca, it is inherent that the concentration would be greater than 0 mass %. Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter. Regarding the temperature, Bienvenu et al teaches temperatures greater than 500 °C (column 2, line 62) and gives examples of 830 °C (column 5, line 2) and 580 °C (line 64). Regarding Claim 19, Example 1 gives 1.08 kg Ca (column 5, line 42) and 3 kg CaCl_2 (column 4, line 66). This would give a concentration of 36% and a temperature of 930 °C, which is within the claimed range and the operating range of Bienvenu et al (greater than 500 °C). However, , Bienvenu et al does not disclose discharging CaCl_2 outside the reactor vessel as in Claim 18 or electrolyzing the molten salt and generating Ca by the electrolysis for the generation reaction of Ti or the Ti alloy in the reactor vessel as in Claims 18 and 23. Winter teaches producing titanium metal as shown below in the Figure:

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to recover Ca from the $CaCl_2$ produced in the process of Bienvenu et al as taught by Winter, since Winter teaches utilizing by-products to produce a magnesium-calcium alloy for use in the reduction for use in the reduction of a metal halide reactant, specifically titanium metal and alloys thereof (column 1, lines 60-67). Winter also teaches that it is well known in the art to chemically and/or electrically recover the by-product halide salt obtained from the reduction to recover reducing metal and halogen values present therein (column 1, lines 23-26). Though Bienvenu et al teaches as a secondary feature generating calcium from calcium carbide in column 2, lines 21-32), this does not teach away from the combining the teachings of Bienvenu et al with those of Winter.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 5-10, 17, 21 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 2 of copending Application No. 11/992,162. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims as presented do not claim wherein the molten salt increased in Ca concentration through the use of a principal electrolyzer in said electrolysis step is introduced into a regulating cell having a Ca supply source as in Claim 1 of Application No. '162. Regarding Claim 17, though Application No. '162 does not claim that the concentration of Ca is greater than 0 mass %, it is inherent that the claims Application No. '162 read on a mass % of greater than 0 since Ca is present.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1, 6-10, 17, 21 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 13 of copending Application No. 11/991,072. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims as presented do not claim increasing the Ca concentration. Regarding Claim 17, though Application No. '162 does not claim that the concentration of Ca is greater than 0 mass %, it is inherent that the claims Application No. '162 read on a mass % of greater than 0 since Ca is present.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1, 6-10, 17, 21 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/589,879. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims do not claim generating Ca on a cathode electrode. Regarding Claim 17, though Application No. '162 does not claim that the concentration of Ca is greater than 0 mass %, it is inherent that the claims Application No. '162 read on a mass % of greater than 0 since Ca is present.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1, 6-11, 14, 17, 18, and 21-23 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7, 11 and 12

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of copending Application No. 10/589,949. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims as presented do not claim generating Ca on a cathode electrode side by the electrolysis as in Claims 1-4, 6, 11 and 12, the reactor cell configuration as in Claim 1, the molten salt comprising KCl, LiCl or CaF₂ as in Claim 6, or the size of the Ti or Ti alloys as in Claim 12.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 8-12, 17, 21 and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 8, 10, 17, 19 and 21 of copending Application No. 10/575,224. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims as presented do not claim an alloy electrode made of a molten Ca alloy that employed for a cathode as claimed.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1-3, 6, 7, 8, 11, 12, 13, 15, 17-19, 22, and 23 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3, 4-7, and 11-13 of copending Application No. 10/590,863. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims as presented do not claim a Ca generation step by Na introduction, in which Ca is generated by introducing Na into molten salt containing CaCl₂ as claimed.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 1-7 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-7 of copending Application No. 10/575,224. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP 2002129250 teaches producing metallic titanium, in which the obtained product is heated to ≥ 800 °C to obtain molten calcium chloride. The molten calcium chloride is electrolyzed and is separated into a molten (Ca + CaCl₂) mixed phase and gaseous chlorine, and the former is used as a reducing agent in a first stage, and the latter as gaseous chlorine in a second stage (abstract). Cobel et al (US 3,043,756) teaches producing calcium metal by the reduction of calcium compounds using titanium and by the electrolysis of calcium chloride (column 1, lines 27-36).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit
1793

/T. M. M./
Examiner, Art Unit 1793
29 April 2008